Midwest Engineer

WESTERN SOCIETY OF ENGINEERS FOUNDED 1869

NUCLEAR REACTORS IN FUTURE POWER DEVELOPMENT — PAGE THREE

Vol. 3 JULY, 1956 No. 2

Better, More Economical Hospitals Are Built with *CONCRETE*

More and more designers and builders are turning to concrete construction for hospital buildings. That's because concrete offers greater durability, safety and economy.

Concrete meets every structural requirement for hospitals. It has great strength and unexcelled resistance to destructive forces. Durable concrete protects patients and hospital staff against violent storms, 'quakes, explosions, atomic blasts and fire. *Remember, concrete can't burn.*

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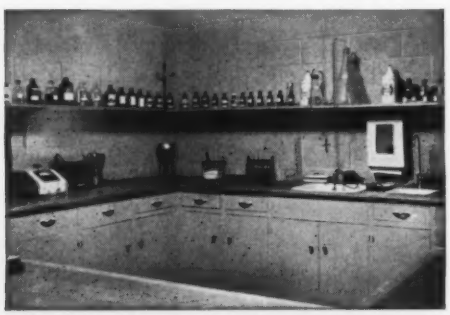

Many hospitals are using concrete masonry for interior walls and partitions. These concrete masonry walls have great durability and can be painted in any of a wide variety of colors with portland cement paint. The photos show a reception room and laboratory which are built with concrete masonry walls.

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GENERAL AND EDITORIAL OFFICES
HEADQUARTERS OF
WESTERN SOCIETY OF ENGINEERS
84 E. RANDOLPH STREET
CHICAGO 1, ILLINOIS
TELEPHONE: RANDOLPH 6-1736

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COVER STORY

On the cover this issue we display an interesting study in architecture. The picture is an artist's rendering of one of the entrances to the new Parma, Ohio, Research Laboratories of National Carbon Company, a division of Union Carbide and Carbon Corporation. The multi-million dollar laboratories, which will be dedicated Sept. 18, 1956, will be devoted to basic research in chemical and solid state physics.

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Nuclear Reactors in

Future Power Development

By Andrew W. Kramer

When Elliott Johnson asked me to come here tonight to talk to you about atomic energy I wondered what I might be able to tell you about the subject that you had not clearly heard before. For I am sure that all of you have been exposed to all sorts of talks on atomic energy by varying degrees of experts, and, at this particular meeting, I certainly am not far enough away from home to qualify even as a minor expert.

However, I was glad to accept the invitation because I have been more or less with atomic energy for over ten years and it is a subject in which I have a tremendous and continuing interest.

One of the astonishing things about atomic energy is that there can be so much to say about so small a thing as an atom. Somebody has said that everything connected with atomic energy is huge except the atom itself. That remains very small.

We have been living in the Atomic Age for only twelve years but in those twelve years the Government has developed it into the biggest business in the world. With over 12 billion dollars of our money in it few people realize how huge this government-owned industry has become. The 12 billion exceeds the combined capital of General Motors, U. S. Steel, Bethlehem Steel, DuPont, and Alcoa.

So far most of this money has been spent on the development of weapons but now, at last, that phase of the program is beginning to let up and we are embarked on an Atoms-for-Peace movement. While we have scarcely begun, the start in this direction is good, indeed; last year stands out as a year of tremendous progress, not only as concerns technical development but also in terms of human relations. The most important event of last year was not so much the announcements of the large atomic power plants to be built by private companies, or the success of the *Nautilus*, or the development of the boiling water reactor, but the Atoms-for-Peace conference at Geneva last summer. Here, for the first time, nuclear scientists and engineers from all over the world, including Russia, came to meet and talk. And they laid their cards on the table — the Russians as well as the Americans and the British.

As a consequence there has been great progress in bringing atomic energy closer to industry and a tremendous amount of useful information has been declassified for use by industry.

Last fall I had the opportunity of visiting the exhibit which the United States had at Geneva. While I had read about it, it was still quite astonishing to see, particularly as it reflected the removal of secrecy. It so happened that about six months before— that is, in May of last year, I had attended a highly classified conference at the Bettis plant of Westinghouse near Pittsburgh where the reactor for the Shippingport atomic power plant is being built. There we were shown the fuel elements of the Shippingport reactor but under strict secrecy — everybody at that conference had to be Q-cleared. But at Geneva, last summer, and in New York last fall, there were all the same fuel elements on display, open to all the public. Indeed, there were shown not only the Shippingport fuel elements but also fuel elements from half a dozen other AEC reactors. As I told an AEC friend of mine when looking at the New York exhibit — "we have come a long way in six months." This perhaps, more than anything else, showed how much progress we made during the year in opening up the field of atomic energy to private enterprise.

As you know, during the past year we have not only modified the government's iron-clad monopoly on atomic material by rewriting the Atomic Energy Act of 1946, but have also made it possible for any firm or individual to explore certain types of classified data by means of Access Agreements. The regulation concerning these Access Agreements is a forward step which will greatly benefit industry — particularly small industry, since it gives small manufacturers a chance to find out how they might get into the atomic business. Heretofore no one had access to secret material without Q-clearance. Now, with the so-called L-clearance there is easier access to such data.

As a result of this opening up of the Atomic Energy Act there has been a tremendous spurt of activity in the field on the part of private industry. Scarcely a day passes without some announcement of some new nuclear project being announced.

Now, it is reasonable to ask, why are we so determined to get into the atomic power business? What is there about Atomic Power that is so all-fired important. We certainly have ample coal, oil, and gas fuel resources so that we don't have to develop nuclear power. Of course many people are carried away with the thought of atomic energy, with the main emphasis on *atomic* because it is new and dramatic.

But we know that American industry and the Government is not investing money and research in the development of peacetime atomic power simply be-

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Mr. Kramer, editor of POWER ENGINEERING, presented this talk before the Western Society of Engineers in Chicago on Feb. 28, 1956.

cause it is a dramatic and novel way of generating power.

The reason we are interested in developing atomic power is that it seems to provide us with the answer to a problem which already exists to some extent and which is bound to grow more vital in the future. That problem involves the future energy resources of the world.

In other words, *Atomic* energy is important only because *all* energy is important.

With this thought in mind, let us examine a question which is important to all of us. Where does atomic energy fit into the economic structure as we know it today, and as we project it for the future?

One does not have to be a major prophet to be able to work out some sort of an answer to this question. All we need do is to study the history of the growth of the electric power industry. The growth of electric power expresses in one simple index the American miracle of productivity and living standards. Since World War II, our electric-generating capacity has more than doubled, and now stands at 117 million kilowatts. If this rate of growth continues over the next 25 years, the atomic power capability of the United States in 1980 could be larger than our entire electric generating capacity now.

Yet so huge, so complex, so adaptive, so ever changing is the American economy that the coming of economic electric power from nuclear fission will have many beneficial and few, if any, disruptive impacts. Special impact of atomic power may be hard to isolate, 25 years from now, from the sum of the forces which will have come to bear on the power economy of the world's greatest energy user.

Within 25 years our total electrical output may have gone up 3 to 5 times. If so, the national investment in generating, transmission and distribution facilities will have risen from around $40 billion to between $125 and $210 billion.

Using forecasts favorable to a high rate of atomic-power growth, atomic reactors, would in 1980, still be generating less than one fourth of our power. On the other hand, using forecasts pessimistic to the use of fossil fuels, steam power plants will then still be burning more than 60 per cent more coal than they do today.

The chart which I have here was taken from the recent McKinney Report to the Joint Congressional Committee on Atomic Energy. It shows two forecasts of growth of United States electric generating capacity. As you see from these curves, the power requirements of the U. S. could go as high as 600 million kilowatts by 1980. This is the optimistic forecast. The lower curve — the most unfavorable outlook — shows that the load in 1980 is not likely to go below 358 million kilowatts. (See Figure 1.)

Of course, no one can say with absolute certainty that our electrical load will continue its upward trend but as most of you no doubt know, the use of electricity has been doubling every ten years and there is every indication that it will continue to increase in the same way in the foreseeable future.

It is, therefore, quite reasonable to predict, as did the McKinney panel in making up this chart, that by 1980 — 25 years from now — we will have somewhere between 50 million and 135 million kilowatts of nuclear power generating capacity installed in this country.

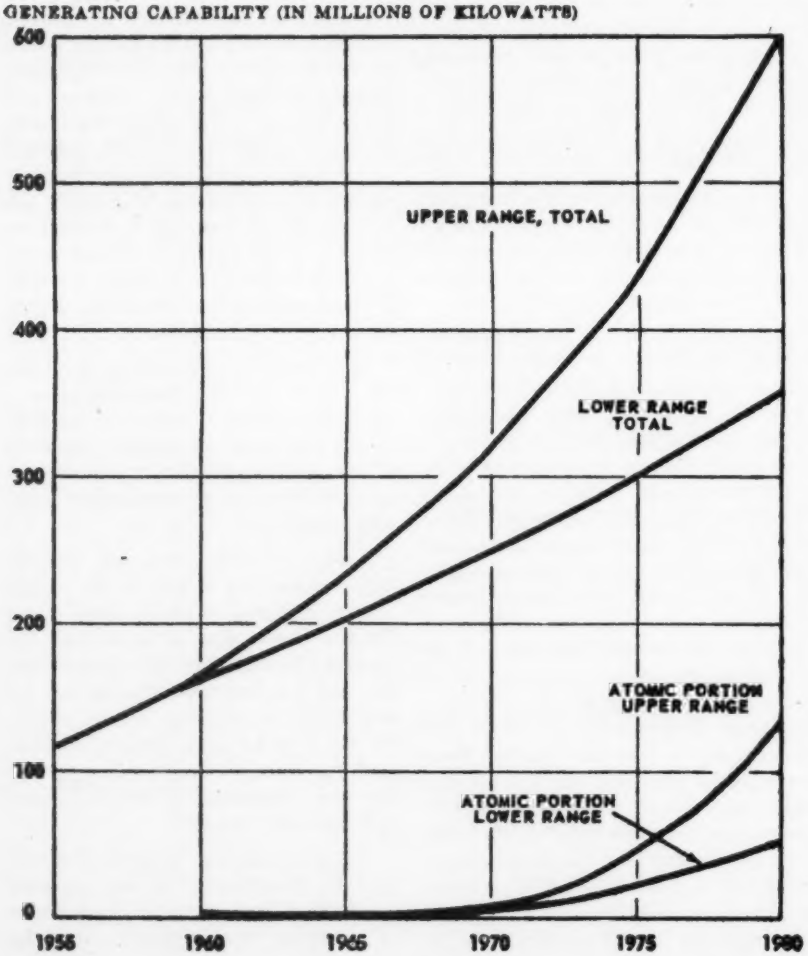
But you may ask why should we go to atomic power merely because the electrical demand is expected to increase at such high rates. After all we still have immense quantities of coal and oil and we could continue to use these fossil fuels to good advantage.

Well, there are several good reasons why we will go to nuclear power. I have

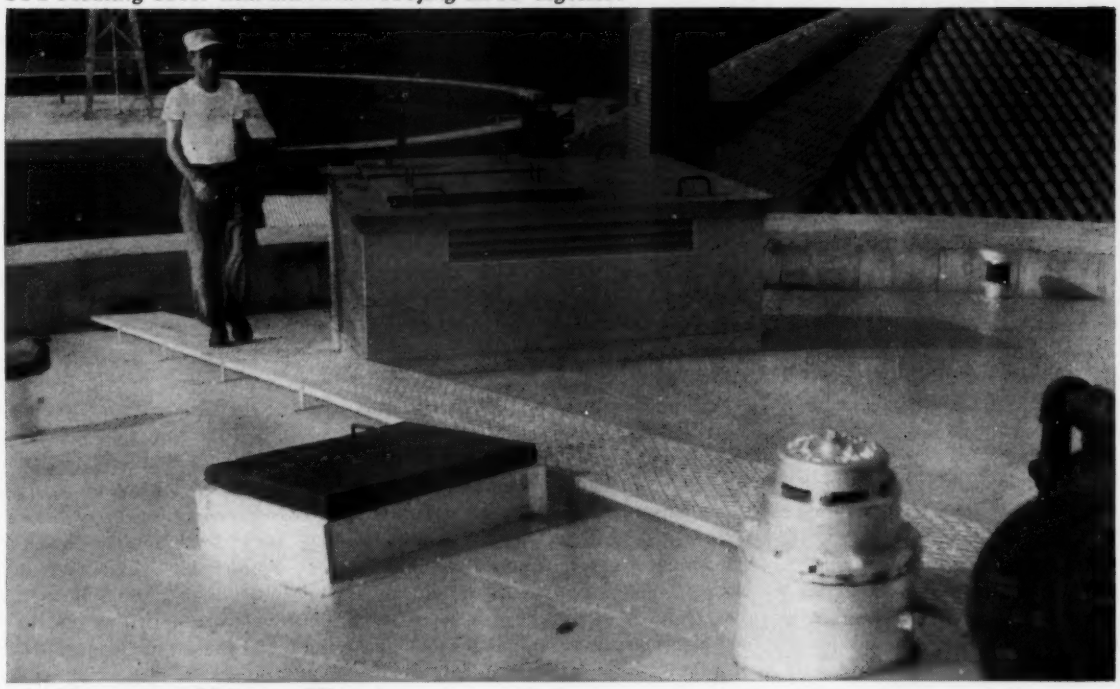
(Continued on Page 18)

FIGURE 1

TOTAL U. S. ELECTRIC GENERATING CAPABILITY AND PORTION THAT MAY BE ATOMIC



PFT Floating Cover with aluminum roofing on 65′ digester.



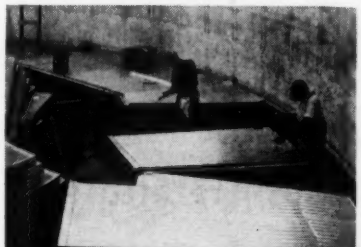
At Champaign-Urbana, Illinois . . .

A sewage plant invests in long-range economy

PFT metal roofing on new Floating Cover provides longer life, better insulation

With future economies in mind, the Champaign-Urbana Sanitary District specified a *PFT Floating Cover* with *metal-clad roofing* for their new 65′ diameter digester.

The metal roofing provides four distinct advantages over conventional wood types: (1) longer life—equal to the life of the Floating Cover, (2) more efficient insulation, (3) fewer maintenance problems, (4) easier assembly and installation.



Shown at actual installations, PFT metal sections are easily unpacked and assembled. Cardboard boxes in foreground contain panels as they are shipped.

Section of roofing showing (1) aluminum top sheet, (2) inch-thick fiber-glass insulation, (3) aluminum reinforcing channel, (4) corrugated supporting ribs.

PFT metal roofing consists of prefabricated sections with embossed aluminum top sheets, each piece marked for easy assembly at the plant site. The sections are designed for close fitting in the field with a 3″ lap of top metal covering at all joints (see illustration). Cutout sections are provided to fit around sampling walls, hatch framing, manholes, etc.

With fiber-glass insulation, PFT metal roofing resists heat loss and keeps digester heating costs at a minimum.

Ventilators are provided for the space between ceiling plate and roof deck. Also included is a 19″ wide walkway of galvanized steel, deformed for sure footing.

The PFT Floating Cover at Champaign-Urbana includes a complete *Pearth Gas Recirculation System*—an economical process that controls the formation of scum, making more effective use of the entire digestion tank capacity.

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Civil Engineers Ready: Needles

The civil engineers of the nation are fully prepared and alert for the tremendous job before them in the new Federal highway program, Enoch R. Needles, of New York, president of the American Society of Civil Engineers, asserted in a statement issued at the organization's headquarters in New York on June 28.

Applauding Congress and the Administration for the "courage and forward-looking which are most evident in the drafting and enactment of this new legislation," Needles said that the engineers and builders will have the advantage of new methods and techniques. Recalling "legendary feats" of war-time construction, Needles commented that "no other nation equalled us" and gave assurance that "these abilities and resources are still ours."

The statement by Needles, who has a distinguished record of achievement in design and construction of many major turnpikes and highways, said:

"Our nation is now road conscious and something is about to be done about it.

"The new Federal highway legislation constitutes a revolutionary development in the 30-year battle to bring our highways to a standard of modern design and construction which will be in keeping with our present highly motorized economy. The Congress and our Federal administration are to be complimented highly because of the courage and the forward looking which are most evident in the drafting and enactment of this new legislation. Our highway problems could never begin to be capable of solution with any less bold provisions for financing and constructing the new facilities.

"Since the early Twenties, the motor vehicle for highway transportation has changed almost every year, and sometimes radically each year, as the new models have come out with steadily increasing speed, power, and safety provisions. The advance of the motor vehicle to its present position of usage and prestige is a fantastic story all of its own. But our highway engineers and officials have never been able to keep pace in their highway building with the radical and continuing changes which came in motor vehicles.

"As late as 1920, we had a highway system throughout our nation which was generally from 50 to 100 years of age. All roads were conceived in terms of horse-drawn vehicles, and many major highways followed the pioneer Indian trails and cattle paths. Along and around these highways were built our villages, and later our cities; with all of the buildings and facilities of civilization which would naturally grow up along these lines of transport and communication.

"A highway to accommodate the leisurely gait of horses at four miles per hour is one thing. The modern expressway to accommodate a multiplicity of traffic lanes, each carrying mile-a-minute trackless vehicles, all with maximum safety and freedom from confusion, is wholly something else. In building the new highway of today, with flat curves and gentle grades, generally a new right-of-way must be provided, adjustment of existing buildings, facilities and utilities must be cared for, previously unheard of quantities of earth and rock must be moved, bigger and more bridges and tunnels must be built, the finest and best road-beds and paved wearing surfaces must be provided, and sums of money to pay for all these things must be made available which are truly staggering when compared with highway expenditures of only a generation ago.

"Just before World War II, there was a rather common yardstick of $50,000 per mile to represent the cost of a modern heavy-duty highway to accommodate our highway loads of that period. This of course was only a two lane highway. Today, our multi-lane expressways are in corresponding demand to serve our economy, and these create no great surprise when they cost as much as $500,000 per mile.

"Another graphic visualization of the magnitude of the problem before the Congress lay in the increased motor vehicle registration from 30,000,000 vehicles in 1946 to 62,500,000 vehicles in 1956; with very limited increase in mileage or modernization of old highways to serve this increased registration.

"The highway engineer and the highway builder have known these things during the past ten years but were almost powerless to cope with them because of the limitation on available funds. There was little enough money for maintenance of the old roads, and much less for the building of new. So high praise indeed is to go to the Congress and the Federal administration for now providing the program and the funds by which a modern national highway system can be brought into being.

"With all of the current talk about the 'shortage of engineers' there is full rea-

son to discuss the capacity and adequacy of our highway engineers and their state and private organizations and our highway contractors and material suppliers to produce promptly the services demanded by the new Federal highway program. No doubt the facilities of our state highway departments supplemented by their highway engineering firms will be fully taxed in getting this program organized and under way, but there appears no sound reason to question their ability to function adequately.

"The flexibility and resource of our civil engineering and construction agencies were fully tested in the early part of World War II and the days preliminary thereto. Never before in the history of this or any other nation was so much to be built in so short a time. The success of this effort is to be measured in terms of our success in winning the war. Throughout the war, at home and over the seas, our engineering and construction organizations and equipment performed legendary feats in building roads, airfields, docks, camps and structures of all types. No other nation equalled us. These abilities and resources are still ours.

"New engineering methods and design techniques are now available to us which have never been fully utilized heretofore. Aerial photography is not new, but the uses of such photography for mapping, for highway location in mountainous country, and for geological and soil investigations are steadily advancing in accuracy and scope. Greatly improved optical devices permit contour plotting from aerial photographs which could be accomplished by normal surveying methods only at the expense of many man-hours of laborious effort in the field.

"The newest electronic and mechanical computing devices are being steadily adapted more extensively to engineering calculations which have been burdensome, lengthy and tedious heretofore. Stress calculations for complicated structures, geometric determinations for large and intricate highway interchanges, and computations of large earthwork volumes, are typical of the calculations to which these computing machines are now being adapted.

"Changes in the assignment and usage of professional civil engineers are already in process in numerous highway organizations. Heretofore, we have had graduate civil engineers of experience used in real estate acquisition, personnel work, office administration and other positions of like character, simply because the engineer has filled these positions most capably, but not to his own greatest professional advantage. We can go a long way toward meeting any expanded demand for civil engineering services by using professional civil engineers in professional positions, using them as advisors, directors and supervisors of engineering aides and non-professional personnel. As was proven in the preparatory construction for World War II, it is surprising how quickly engineering aides and assistants of a non-professional type can be enlisted and trained to do surveying, mapping, drafting and other simpler forms of work which will relieve greatly the burdens of the professional engineer when properly directed.

"The hopes and expectations of many years standing are being realized for our state highway authorities in the legislation for our new Federal highway program. The highway engineers and builders are ready to do their parts in bringing the new highway system into existence on schedule."

Asphalt Institute Prepares for Roads

The Asphalt Institute has begun moving to strengthen its field engineering forces in anticipation of the greatest Federal aid road-building program in the nation's history.

Headquarters officials also began a re-examination of the Institute's five geographical divisions with a view to possible realignment of boundaries for more efficient coverage.

The double-barrelled move was the result of a directive received at the recent board of directors' midyear meeting at Pebble Beach, Calif. It was felt that the present 22-man field engineering staff is inadequate to furnish continuing service to the 48 states when the highway program shifts into high gear. Further, it was felt that present district boundaries possibly can be redrawn for more efficient deployment of field forces.

Early action is expected to take the form of new district engineering offices to be set up in those western and southern states where the Bureau of the Census anticipates fastest population growth in the next two decades.

In another outgrowth of the California meeting, Institute engineers turned to a critical study of present pavement design and specifications. This study will insure adequate designs for the steadily rising volume of automobile and truck traffic which is creating new conditions of wear and stress on all pavements.

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"Monster" Manufactures Cabinets

An electronic "monster" in Maumee, Ohio, is gobbling up carloads of steel and pushing out kitchen cabinets faster than a housewife could clean one with a damp cloth.

The "monster," as it is affectionately called by its creators, Toledo Desk & Fixture Company, Maumee, makers of "Beauty Queen" kitchen cabinets and "Lavanette" bathroom vanities, is the latest work in automation in the steel cabinet industry.

Actually, it is an electronic controlled automatic welding machine that is putting Toledo Desk definitely in the running with its major competitors.

Creative brainpower of executive and engineering personnel of Toledo Desk designed and produced the "monster" by working directly with the engineering staff of Resistance Welding Corporation, Bay City, Mich., machine builder.

Absolutely unique in the steel kitchen cabinet making business, Toledo Desk has the only one ever built. It would cost $100,000 and take a year to duplicate, giving the company a tremendous edge competitively.

Simply by inserting stamped steel parts and pushing control buttons, a complete kitchen cabinet can be turned out in nine seconds.

At full capacity, the "monster" itself can turn out 400 cabinets in an hour or 3,200 in an eight hour working day

It is actually made up of four automatic welding units, closely interlocked by shuttles, electronic timing controls, relay switches and circuit breakers.

Operated by four men, the machine is safety proof in that one man cannot start his unit until the other men have completed their welding operations, thus preventing accidents.

Fully adjustable to build cabinets from 12 to 81 inches high, 9 to 36 inches wide and 13 to 25 inches deep, it can turn out all or part of every cabinet Toledo Desk makes—wall, base, broomers, pedestals and under-sink cabinets. Adjustments from one cabinet size to another average 10 minutes.

Before the "monster" was conceived, it took 18 men one hour to make 140 cabinets, using ten hand-operated weld guns and eight pedestal welders. The men had to square the cabinets with jigs, a time consuming operation, and no two welders ever welded alike.

The new machine eliminates hand setting and hand welding operations. It also will not weld until all cabinet parts are in perfect square.

The net result of the "monster" is not only greater production of a more perfect steel kitchen cabinet, but at a lower cost both to the manufacturer and the consumer.

Here's how the machine operates:

The first unit performs the operation of welding door hinge reinforcements to the cabinet sides.

Then the man on No. 2 unit inserts these sides and a back into the "monster." These are held in perfect square by automatic stops or positioners which are part of the unit.

Then he pushes two start buttons. This brings the air pressure up to operation performance, automatically bringing the position clamps into play, holding the pieces perfectly square. At the same time, the weld guns come into contact with the metal.

An electronic timer control, called a "Robotron," goes into action. First it starts the "squeeze time." This is the amount of time it takes the welding guns to squeeze the two metals together.

Then "weld time" takes over. The metals are fused together with a perfect spot weld.

A third timing cycle, called "hold time," takes over and holds the weld guns down on the cabinet parts until the metals congeal.

Then the machine returns to its original position and stops operation.

"Squeeze time" can be set for 3 to 120 cycles. There are 60 cycles in a second, so if the timer is set for 30 cycles, the two metals are held firmly together for one-half second. "Welding timing" can be set for 3 to 60 cycles and so can the hold "timing."

As No. 2 unit returns to its original position, a relay switch is tripped. This starts the air-operated shuttle which moves the cabinet into No. 3 unit where again it is held in perfect square.

The man on No. 3 unit inserts the top, pushes two start control buttons and again the machine and Robotron timer go into action the same as on No. 2 unit. When the top is welded to the sides and back, the shuttle kicks the cabinet onto another shuttle that moves the cabinet to No. 4 unit.

At No. 4 unit, the operator slides the cabinet into the machine, inserts the bottom, pushes the start control buttons and the machine welds the bottom to the sides and back.

When finished, the 4 unit automatic machine has turned out a wall cabinet that is perfectly welded and squared.

Then the cabinet goes down a conveyor where the door is screwed on.

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New Laboratories Are Dedicated

The new Parma, Ohio, research laboratories of National Carbon Company, a Division of Union Carbide and Carbon Corporation, will be dedicated Sept. 18, it was announced July 19 by Adger S. Johnson, National Carbon's president. Designed primarily for basic research in chemical and solid state physics, the multi-million dollar laboratory brings to seven the number of major research centers operated by divisions of Union Carbide and Carbon Corporation, which in 1955 spent approximately $43 million on research.

The new laboratory facilities are already in operation, Johnson said, with research scientists studying ways to improve existing materials and, more importantly, methods to create new materials for the metal, electronic, power, chemical, and electrochemical industries. A tour of the laboratory will be included in the dedication ceremonies to be attended by company officials and invited guests from industry and the fields of science and education.

"Many of the theoretical concepts we are now dealing with, and the experimental equipment with which to explore them, did not even exist a few years ago," Johnson pointed out, "and so at Parma we have assembled the latest in research tools, staffed by highly competent scientists, and are confident that out of this ideal creative atmosphere will come a deeper understanding of the nature of matter. It is significant that before World War II no more than 100 scientists were engaged in solid state physics research, while today between 3,000 and 4,000 are active in the field.

"Nuclear furnaces, new high-temperature refractory materials, the miniaturization of electronic equipment, entirely new electrochemical battery systems, and scores of other products of the future cannot be developed without a thorough knowledge of the molecular, atomic, and subatomic makeup of solids," Johnson said. "At Parma, approximately 350 National Carbon employees, including 150 scientific and technical personnel, in addition to those engaged in clerical and service operations, will be engaged in this important work."

The new laboratory contains approximately 175,000 square feet of floor space, and is located near the center of a 126-acre plot on Snow Road in suburban Cleveland. Designed for extreme flexibility, with provisions for expansion, the main laboratory building consists of 158 laboratory modules, or individual research units, fully equipped with all the usual service lines and, in addition, unusual features such as lines distributing various rare gases. Supplementing the laboratory facilities are adjacent wings housing the chemical engineering and laboratory furnace areas, machine shop, dispensary, a library with a 12,000-volume capacity, cafeteria, locker and shower rooms, boiler and compressor room, and administrative, clerical and business offices. An auditorium is ingeniously designed to double as a laboratory and projection room for research on light sources for the motion picture industry.

Heading the new laboratory is Dr. Robert G. Breckenridge, 40-year old National Carbon physicist, who previously had a broad background of research experience and accomplishment as chief, Solid State Physics Section, U. S. National Bureau of Standards, and head of Physics Branch, Office of Naval Research at Washington, D. C.

Breckenridge reports directly to Dr. Clarence E. Larson, vice-president in charge of research for National Carbon Company. Larson was formerly director of the Oak Ridge National Laboratory, operated for the Atomic Energy Commission by Union Carbide and Carbon Corporation.

Architects for the new research laboratory were Skidmore, Owings & Merrill of New York City. The Austin Company, of Cleveland, served as engineers, and the construction work was done by The Gilmore-Olson Company, also of Cleveland.

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Soil-Cement Book Is Now Available

A new *Soil-Cement Laboratory Handbook* containing up-to-date information on testing practices is now available.

The completely rewritten booklet includes modifications in practice which have reduced testing time by two-thirds in recent years. Among recent changes discussed are the short-cut procedure for sandy soils, simplification of wet-dry and freeze-thaw tests, and rapid methods of testing soils for small projects.

The handbook is an essential aid to engineers testing soil-cement.

Copies are available free on request in the United States and Canada from the Portland Cement Association, 33 W. Grand Ave., Chicago 10, Illinois.

ASEIB Gets First Application

"The American Sanitary Engineering Intersociety Board, Inc. (ASEIB) has received its first application for a certificate of special knowledge in sanitary engineering," announced Professor Earnest Boyce of the University of Michigan College of Engineering and chairman of the Board of Trustees of ASEIB. In making this announcement Boyce said, "Receipt of this application marks the culmination of more that five years of planning and preparation. It also marks the beginning of the first program of certification of special engineering knowledge in any of the several engineering specialties."

Boyce referred to the incessant demand for sanitary engineers by official public health and departments of public works and by industry for stream pollution control work. He spoke also of the demand by municipalities for air pollution activities, by consulting and designing engineers in the design of water treatment, distribution and conservation schemes; sewage disposal projects and air and stream pollution control activities. He said that the rapidly expanding field of nuclear energy was opening a whole new field and need for sanitary engineers. He further noted that sanitary engineering is unique in that it combines the engineering skills of the civil, mechanical or chemical engineer with a broad knowledge of the biological sciences thereby making it possible to utilize engineering resources in meeting problems of public health.

"The objective of the ASEIB is to improve the practice, elevate the standards and advance the cause of sanitary engineering. A means toward reaching this objective is the certification of those sanitary engineers who meet the criteria established by the ASEIB. All certified sanitary engineers will be carried on a roster to be known as the American Academy of Sanitary Engineering. The basic requirements for certification are registration as a professional engineer, graduation from a college of engineering and at least eight years of sanitary engineering experience.

"Eligibility for certification will be determined on the basis of the applicant's education, experience and an oral and written examination. Applicants with unusually high qualifications and at least 15 years of experience may be considered for certification without examination if the applications are filed before July 1, 1957. All applicants must pay an application fee of $10 plus a $25 examination fee.

"The Intersociety Board is sponsored by the American Public Health Association, American Society of Civil Engineers, American Society of Engineering Education, American Water Works Association and Federation of Sewage Works Associations. The office of the secretary of the board, Francis B. Elder, is located in the Engineering Societies Building, 15th floor, 33 West 29th St., New York 18, N. Y."

Ideas Encouraged

Creativity programs to encourage more employee ideas for company improvement have been started during the past year by 13 oil firms, reports *Petroleum Processing.*

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Metallurgical Section Established at I. I. T.

A research section concentrating on metallurgical problems in the atomic energy field has been established at Armour Research Foundation of Illinois Institute of Technology, Chicago.

The new section will be known as the reactor metallurgy section, according to Robert A. Lubker, manager of the Foundation's metals research department.

The section has been organized in recognition of the growing need for high caliber research on the metallurgy of materials used in atomic energy work.

"It has become increasingly apparent over the years that many of the most serious problems in the atomic energy field are metallurgical in nature," Lubker said.

The Foundation has been very active in nuclear metallurgy problems for several years.

"Increasing volume of research in the field," Lubker pointed out, "now has justified a separate administrative section for work in this new metallurgical area."

The reactor metallurgy section will engage in the development of uranium base and other core alloys, development of fuel-element cladding alloys, metallurgical compatability of fuel elements —core and clad, and development of special reactor materials or components.

Dr. Donald J. McPherson, assistant manager of the metals research department, will be acting supervisor of the new section, and Ray J. Van Thyne has been named assistant supervisor.

Soap Still Important

Europeans still rely largely on soap instead of synthetic detergents, says *Chemical Week.* While the latter have taken over more than half the U. S. market, among western European countries, per capita consumption of these synthetic cleaners ranges from a low of 0.1 pound a year in Italy to a high of 5.8 pounds in Germany. Average consumption of both kinds of cleaners was 11.3 pounds in Italy, 28.7 pounds in Belgium. In the U. S. average usage has climbed by about 50 per cent over the past 50 years, reaching a high of nearly 27.7 pounds a year in 1950.

A.R.F. Sets up Labs in Tucson

Branch laboratories have been established at Tucson, Ariz., by Armour Research Foundation of Illinois Institute of Technology, Chicago.

The increasing volume of research in the Southwest and on the West Coast necessitated opening of the branch, according to Dr. Haldon A. Leedy, ARF director.

Alfred J. Hoehn, assistant manager of the electrical engineering research department, will head ARF's Southwestern Laboratories—the name given to the branch facility, Leedy said.

The new laboratory is located at 443 S. Stone Ave., Tucson.

This is the first branch laboratory to be established by the Foundation, Leedy explained, although ARF directs research facilities in a number of foreign countries on a contractual basis.

All other research, with the exception of the work done at ARF's Riverbank Acoustical Laboratories at Geneva, Ill., is carried out at Technology Center, its headquarters in Chicago.

The Foundation also is opening an European operations office in The Hague, Netherlands, in July, in conjunction with its European Technical Observation Group plan.

Hoehn currently is directing work on two projects for the Army Electronic Proving Ground at Ft. Huachuca, Ariz.

A specialist in radio, radar, and communications, Hoehn and a staff of Foundation engineers have been in Arizona since last August, working on complex man-machine systems involving communications, radar, and radio navigation equipment.

Industrial and defense activities in the Tucson area, especially in the electronics field, have made it particularly desirable for the Foundation to open a Southwestern branch, Hoehn stated.

"Work at the branch laboratories will not be limited to electronics if the demand for research in other areas is sufficient to warrant expansion," he said.

Founded in 1936, Armour Research Foundation today has become one of the world's largest independent research organizations, having an annual research volume in excess of $11 million.

The Foundation performs basic and applied research on a contractual basis for industry, the government, and the public. Its scope of activity covers practically all of the physical sciences and fields of engineering.

Research at the Foundation is conducted under what is known as the "Armour Plan"—the team approach to scientific investigation.

Under this philosophy, it was pointed out, diversified talents are focused on projects which often cross departmental lines.

More than 550 research projects are handled annually through ARF's nine departments.

Sheep Don Duck Duds

Overcoats for sheep are in vogue in New Mexico, reports *Textile World*, McGraw-Hill publication. An estimated 50,000 sheep next winter will be wearing jackets made of ten-ounce duck to keep their fleeces cleaner.

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Name Three to European Staff

Three scientists have been named to the European operations staff of Armour Research Foundation of Illinois Institute of Technology, Chicago.

Appointed to serve as observers for the European Technical Observation Group recently established by the Foundation are Dr. Hugo H. Peter, Wlodzimierz J. Polny, and Eugene R. Kun.

Headed by Herbert B. Gausebeck, manager of ARF European operations, the team of observers will leave for its headquarters in The Hague, Netherlands, on July 21, according to Paul B. W. Gollong, manager of the Foundation's international department.

Eighteen non-competing firms have enrolled in the ETOG plan established by ARF as a service to American companies interested in keeping abreast of European technological developments, Gollong explained.

Gausebeck will serve as chemical engineering observer while the others will cover the following categories: Peter, chemistry; Polny, mechanical engineering, and Kun, electrical engineering. A fifth observer, in the metallurgy category, will be named later.

Educated in his native Switzerland and the United States, Peter obtained a bachelor's degree in pharmaceutical chemistry from the Trade School of Druggists in Lucerne in 1945. He was granted an M.S. degree by the Technical University at Burgdorf in 1948 and received his doctorate in organic chemistry from Washington University, St. Louis, in 1954.

Prior to joining Armour, Peter was employed as a chemist by Hoffman-La-Roche in Basle, Switzerland, and since 1954 had been associated with the research laboratory of Standard Oil Co. (Indiana), engaged in exploratory research in the field of new chemicals and radiation chemistry.

Polny, a native of Poland, received an M.S. degree in mechanical engineering from the Lwow Institute of Technology in 1936. Before coming to the United States in 1943 as assistant air attaché for the Polish Embassy in Washington, D.C., Polny was engaged in research and engineering in Poland and France.

He served as a pilot with a Royal Air Force Squadron in England and held the rank of lieutenant in the Polish Air Force during World War II. He has been associated with Air-Trails, Inc., California Rotogravure Co., Metal Export Co., Allied Processes, Consultants and Designer, Inc., and Loewy-Hydropress Division of Baldwin-Lima-Hamilton.

Born in Hungary and educated in Austria, Kun was graduated with the degree of Diplom Ingenieur in electrical engineering from the Technische Hochschule in Vienna in 1934.

Welding Economics Are to be Stressed

Conditions under which it is economical to utilize welding in manufacturing processes, and which welding method is preferred for the particular job, will be stressed at the third annual Midwest Welding Conference to be held in Chicago Jan. 30 and 31, 1957.

The conference, sponsored by Armour Research Foundation of Illinois Institute of Technology and the Chicago section of the American Welding Society, will be held in the Illinois Tech Chemistry Building at 3255 S. Dearborn St.

The two-day program will feature 12 speakers who will present various phases of welding.

Three hundred persons are expected to attend the conference, according to chairman Harry Schwartzbart, supervisor of welding research at Armour Research Foundation.

Automation Betters Network Systems

Since automatic protection switching was inaugurated on the Bell System microwave radio and television networks in Denver in 1954 marked improvement has been noted in the reliability of the systems, a Bell Telephone Laboratory, Inc., engineer reported in San Francisco on June 29.

The report was made by G. H. Klemm, Murray Hill, N. J., in a paper, "Automatic Protection Switching for TD-2 Radio System," presented at a symposium on radio communications during the Summer and Pacific General Meeting of the American Institute of Electrical Engineers at the Fairmont Hotel.

Automatic protection switching was put into service on the Denver and Sacramento route in June, 1954, Klemm said. "Since that time, other routes have been equipped with this protection. Tests and service operations have proved that the automatic protection switching is providing market improvement in the reliability of the TD-2 system."

At the end of 1955, the Bell System was using radio relay on nearly 8,000,000 miles of telephone circuits and over 53,000 miles of television circuits, Klemm said.

The reliability has been achieved by sound circuit and equipment engineering, high quality components and careful manufacture, good installation and maintenance practices, provision for automatic alarms and standby facilities, and specially designed automatic protection switching system, he said.

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Civil Defense Contracts Awarded

A Chicago research organization has been awarded two contracts to determine the best civil defense warning signal system for use in event of enemy attack.

The contracts, totaling $63,575, have been awarded to Armour Research Foundation of Illinois Institute of Technology, Chicago, by the Federal Civil Defense Administration.

Armour scientists will investigate the use of power lines and telephone systems to transmit warning signals, according to Virgil H. Disney, manager of ARF's electrical engineering research department.

Purpose of the study is to determine a method of transmitting signals which would permit the design of an effective alarm system at a minimum expense, Disney said.

Different approaches to the problem will be carried out in separate projects by scientists in two sections of the electrical engineering department.

The use of power lines to transmit warning signals while concurrently maintaining power for the community will be studied by the electric machines, components, and measurements section, according to the supervisor, Dr. Harold L. Garbarino.

The computer development section will investigate the use of telephone systems as a means of warning the general public, under the supervision of Edward A. Roberts, assistant manager of the electrical engineering department.

Working under a $39,557 contract, Garbarino's section will try to determine the most effective and economical warning system for cities, based upon a signal transmitted by a power distribution system.

The study will involve consideration of a suitable signal receiver for use in homes, offices, and factories, a device to generate a warning signal, and problems in transmission, Garbarino explained.

Robert's section will investigate systems that would permit sending out alarm signals without making the telephone system inoperative, except possibly during the period of transmitting the alarm. The telephone systems study will be conducted under a $24,918 contract with the FCDA.

Printed Circuit Tool Is Now Being Made

A new angle socket has been designed and is being manufactured by the Cleveland Metal Specialties Company, Cleveland, Ohio, for use in electrical and electronic units in conjunction with printed circuits.

Designed and developed by Al Gross, the company's chief engineer, the angle socket provides for the mounting of tubes in units where there is limited height, and for maintenance and servicing acessibility where circuit boards are plugged vertically into larger units or terminal strips.

Extreme structural rigidity is provided to the socket by the specially designed supplementary buttress ribs which maintain the angle position of the socket to the printed circuit. Structurally, the ribs will withstand great pressure so that the socket cannot be bent out of position or torn from the circuit board.

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Air Surveys Speed Highway Location

Air surveys are speeding final design and location of the Northern Illinois Toll Highway. They are being performed for the Illinois Toll Highway Commission by Aero Service Corporation, photogrammetric engineers of Philadelphia, under a $140,000 contract. The route strip, 193 miles long and 500 feet wide, covers a circumferential route around Chicago with extensions northward toward Milwaukee, northwest to Beloit, and westward to Aurora.

Fully detailed topographic maps, with one foot contour interval and a horizontal scale of one inch equals 50 feet, are being prepared for commission officials. These maps will show manhole covers, curb lines, telephone poles, and other needed information for final steps of highway design, along with buildings, streets, fences, railroads, and rivers.

It is estimated by Aero Service engineers that all topographic maps will soon be delivered. The air survey is bringing very substantial savings in time and costs. Ground surveys of the same area would take more than a year to complete. Each day saved is important, for the interest costs for the Toll Highway bond issue amounts to thousands of dollars per day.

Aerial photography, the first step in the mapping project, has been completed. More than 1400 air photos were made to cover the route. Each nine by nine inch photo shows approximately 115 acres.

The photo-mapping plane was a single-engine Cessna. It flew at 1,500 feet. The air photos will be related to the ground control data being furnished by section engineers of the Illinois Toll Highway Commission.

Last year, Aero Service mapped 465 miles of preliminary routes in 75 days for the Illinois Toll Highway Commission. Final route alignment of the highways was made from these maps.

From Little Cones...

In New Guinea, pine seedlings protected by a DDT spray at regular intervals become 40-foot trees with seven-inch-diameter trunks in only five years, reports *Chemical Week*.

Note: Please Paint Your Masonry

Paint producers are hoping that a rash of new products for the masonry owner will alert him to the fact that masonry needs painting, *Chemical Week* says. Upcoming range of raw materials now being put to use on the masonry wall includes chlorinated natural rubber, vinyl acetate, vinyl chloride, styrene-butadiene and silicones.

Many a homebuilder thinks of masonry—the concrete, stucco or brick areas of his home—as a wise investment because of its good appearance, durability and low upkeep. But his reluctance to face the fact that most masonry should be painted has been the major factor to date in keeping down sales of masonry paints. On home exteriors, the largest masonry paint market, the 1955 gallonage probably didn't exceed 4,250,000—worth perhaps $20,000,000 to $25,000,000, and still not over 50 per cent of this potential market.

For interiors, particularly floors, styrene-butadiene solvent coatings, and those based on chlorinated rubber have the cream of the market. But due to lengthy preparation necessary before they're used, and because of their high solvent odor, they're in for some rough competition, the magazine says. A new concrete floor paint—one of the hottest new products on the market—has three properties that could make it a real trend setter: it doesn't require an acid etch before floor application; it's water thinned, virtually odorless, and it dries to "walk on" hardness in less than one hour. It is a combination-latex vehicle using acrylics and other materials. Another coating with a big potential is a vinyl toluene resin paint now under development which is said to have far less odor than conventional solvent-type concrete paints.

For exterior usage, there is increasing emphasis on silicones, either alone, to produce colorless water-repellent surfacing, or in combination with other paint elements. The styrene-butadiene (solvent type) materials, though generally less compatible with other paint resins than chlorinated rubber, can be used with silicones to enhance the properties of both.

However, as heavy-duty paints, the masonry finishes have a deserved reputation as being tough to apply. Until they're made easier to put on, less "painty" in their characteristics, they're not going to be as popular and as widely used as their usefulness would suggest, according to the magazine.

ASTE Wins Award From Diamond Group

The American Society of Tool Engineers has been presented a special award by the Industrial Diamond Association of America, Inc., Pompton Plains, N. J. The award was presented at a Steering Committee meeting of The American Standards Association Committee B-67.

ASTE was given the award "in recognition of its service to the industrial diamond industry and American industry in general by its sponsorship of the Industrial Diamond Symposium in Chicago, March 19-21, 1956, and in particular for its cooperation with the management of the Industrial Diamond Association of America, through these many years, in the fields of technical education, exhibitions and standardization."

Presentation of the award was made by IDA President Jan Taeyaerts (president, Precision Diamond Tool Co., Elgin, Ill.) to Harry E. Conrad, ASTE executive secretary, who accepted it on behalf of the Society.

The diamond Symposium, cosponsored by Armour Research Foundation, was part of ASTE's 24th Annual Meeting and Industrial Exposition. It consisted of 12 technical papers on shaped diamond tools presented by world-renowned diamond authorities and represents the most complete information available today on shaped diamond tools. More than $4,000,000 of industrial, gem and man-made diamonds were on display.

The Industrial Diamond Association, spokesman for the industrial diamond industry, is composed of industrial diamond importers, dealers and producers of diamond tools.

A New Definition

Though everyone is interested in air conditioning as relief from summer discomfort it is surprising how many people are not aware of what actually constitutes air conditioning.

To some air conditioning is a window fan, to others it is a mysterious something which makes a place an inviting escape from the hot sun. Others know it has something to do with making hot air cold. Few people realize that true air conditioning provides comfort in all seasons of the year.

As a means of clarifying the situation a simplified definition of air conditioning has been prepared and adopted by the American Society of Heating and Air-Conditioning Engineers.

The definition announced by Society President John W. James, MWSE, at the recent Semi-Annual Meeting of the Society in Washington, D.C., reads:

"Air Conditioning is the process of treating air so as to control its temperature, humidity, cleanliness and distribution to meet the requirements of the conditioned space."

It is the hope of the Society, according to James, that this definition will prove helpful to the public when considering the selection of equipment.

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Hearing Loss to be Considered

Problems concerned with hearing impairment will be among the subjects considered at the seventh annual Noise Abatement Symposium to be held in Chicago Oct. 11 and 12.

Four papers dealing with several aspects of industrial hearing loss—a matter of special interest to industry in states in which hearing loss compensation laws are in force or being considered—will be considered at the Oct. 12 morning session.

The talks will cover legal phases of the problem, hearing loss compensation laws, the use of audiometers, and clinical experience with automatic audiometers.

Three other half-day sessions devoted to machinery and transportation noises and the control of noise through architectural design will complete the two-day meeting, which will be held at the Hotel Sherman.

Several hundred scientists, engineers, architects, manufacturers, physicians, and civic authorities are expected to attend the symposium, according to Guy J. Sanders, supervisor of noise and vibration control research at Armour Research Foundation of Illinois Institute of Technology, one of the sponsoring organizations.

Six papers on reducing machinery noise will be presented Oct. 11. Their subjects will be: jet engine noise reduction; estimating aircraft noise disturbance in building design; materials and techniques for damping vibrating panels; preventing noise in pump systems; controlling multiple noise sources by proper phasing, and reduction of transformer noise by enclosures.

The Oct. 12 afternoon session, titled "Quieting a Noisy Environment," will cover the following: acoustical engineering principles of noise reduction; retaining high sound transmission loss in modern factories; use of partial enclosures to reduce noise in factories, and reduction of noise in factory offices.

To accommodate an expected increased attendance, the 1956 symposium will be held at the Hotel Sherman instead of the campus of Illinois Institute of Technology, the site of previous meetings. Approximately 300 persons attended the 1955 symposium.

Symposium co-sponsors with Armour Research Foundation are Acoustical Society of America, American Society of Safety Engineers, National Noise Abatement Council, American Society of Planning Officials, American Industrial Hygiene Association, and Acoustical Materials Association.

The Paint Industry Is Likened to Poker

Somewhat the same fascination found in poker pertains to the paint industry, says *Chemical Week*. In poker, it's possible to draw over 2,500,000 different five-card hands from a 52-card deck. In the paint business, from the 1,000 different raw materials usually stocked by a good-size coatings company, almost ten trillion different formulas containing only five ingredients are possible. This complexity is further compounded by the introduction of 400-500 new ingredients every year.

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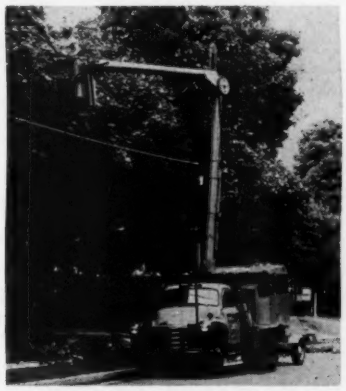

"Fifty Years of Progress" Is Theme

"Fifty Years of Progress Through Electronics" will be the theme of the 12th annual National Electronics Conference in Chicago on Oct. 1-3.

This year marks the golden anniversary of the electronics industry — founded in 1906 when Lee De Forest developed the first three-electrode vacuum tube, known as the audion.

Approximately 100 technical papers and a record 240 commercial exhibits will be featured at the three-day conference at the Hotel Sherman in Chicago's Loop.

More than 10,000 persons are expected to attend the meeting—the nation's leading forum on electronic research, development, and application.

The conference is sponsored annually by the American Institute of Electrical Engineers, Institute of Radio Engineers, Illinois Institute of Technology, University of Illinois, and Northwestern University.

Also participating in the conference are Michigan State, Purdue, Michigan, and Wisconsin universities, as well as the Radio-Electronics-Television Manufacturers Association, and Society of Motion Picture and Television Engineers.

Proceedings of the 1955 National Electronics Conference now can be obtained at $5 per copy from the NEC headquarters, 84 E. Randolph St., Chicago.

The 1040-page, cloth-bound book contains the 102 technical papers and three luncheon addresses presented at the 11th annual meeting in Chicago last October.

In addition to the 1955 volume, the following back issues of the NEC Proceedings are available: 1946, 1949, 1950, 1951, 1952, 1953, and 1954.

Good for Something!

Beetles are saving agricultural scientists money and time, says *Chemical Week*, McGraw-Hill publication. At Rutgers University, the insects are used to evaluate the nutritional value of experimental wheat and soybeans. While rats are the preferred test animal, their appetites are too big for the amount of test food available. The beetles eat less and require less care.

Mexico Pushes Its Research

Mexico City, Mexico—The current trend towards a more vigorous research and development program in Mexico will assure industrial progress in the years ahead.

This is the prediction of Dr. Haldon A. Leedy, director of Armour Research Foundation of Illinois Institute of Technology, Chicago.

Leedy was one of four American research experts who spoke in Mexico City on July 23 before the Mexican Industrial Development and Research Seminar at the Industrial Productivity Center.

Sixty Mexican industrialists attended the seminar arranged through the Council for International Progress in Management in cooperation with the U. S. International Cooperation Administration.

"As research and development gains momentum in Mexico, and as the local industries apply the results of research and development," stated Leedy, "Mexico surely will derive the many benefits of research."

He listed these benefits as new industries, new processes, new and improved products, a fuller utilization of raw materials, and "above all, greater return on investments."

Leedy cited syntex—the process being used to produce cortisone derivatives from local materials—as an excellent example of a major industry created in Mexico through research.

"The dry tortilla flour developed at the Instituto Mexicano de Investigaciones Technologicos is typical of the contributions that can be expected from research organizations," he added.

(Instituto. Mexicano de Investigaciones Technologicos was founded in 1950 by the Banco de Mexico with the aid of Armour Research Foundation for the specific purpose of encouraging industrialization through research and development.)

Leedy pointed out that the greatest increases in productivity have taken place in the industrial countries.

"The last 50 years have seen a 2 per cent average annual increase in output per man-hour in the United States," he observed.

"And there are indications that even greater increases are forthcoming," Leedy added. "Since 1947, for example, American productivity has risen nearly 4 per cent annually."

The most important reason for these remarkable advancements in the world, and in the United States in particular, according to Leedy, is technology, "fed by the fruits of industrial research and development."

Increasing population and the expansion of industry brought about the need for a steady stream of new and improved materials, processes, and products, he explained.

It was during this period of need—in the latter part of the 19th century—that organized research and development came into existence in the United States and the other more advanced industrial countries.

"This was the beginning of the eclipse of the independent inventor," Leedy commented.

In the years that followed, scientific inquiry was placed on a more formal basis, with much of the research and development being carried out in company and universities laboratories.

Since then, it was pointed out, there has been a steady growth of extensive research programs in government laboratories, by trade associations, and at independent research organizations.

A Valuable Business

The free world uranium industry does an annual business of about $500,000,000, notes *Nucleonics*. Of this total, the U. S. share runs about $200,000,000.

AIEE Board Elects Clarence H. Linder

The Board of Directors of the American Institute of Electrical Engineers, largest society of its kind in the world, has elected Clarence H. Linder, vice president, engineering, General Electric Company, New York, as a director, N. S. Hibshman, Institute Secretary, announced in New York on July 25.

Linder fills the vacancy caused by the resignation of M. S. Coover, Iowa State College, who has been elected Institute president, taking office Aug. 1. Linder's term expires July 31, 1957.

Linder has been with General Electric Company since his graduation from the University of Texas with a master's degree in electrical engineering.

He was made manager of engineering and manufacturing for the Affiliated Manufacturing Companies Department of the Company in 1950. When the Major Appliance Department was established in 1951, he was named general manager of the Department. He was elected a vice president in 1953.

Linder assumed responsibility for engineering services functions in the company shortly after his promotion. As vice president he is charged with the establishment and maintenance of the fund of knowledge and understanding needed to insure maximum effectiveness of the engineering function throughout the Company.

In addition to membership in AIEE, he is a member of the American Society of Mechanical Engineers, the American Society for Engineering Education and the New York State Society of Professional Engineers.

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Engineer Salaries Continue Up

Starting salaries for engineers continue to climb.

Salaries received by 1956 graduates at Illinois Institute of Technology have reached an all-time high, according to figures compiled by Earl C. Kubicek, director of alumni relations and placement.

"Starting salaries are still spiraling," Kubicek said. "This year's engineering graduates are earning an average of $391 per month as compared with the 1955 average of $383."

The average starting salary has increased every year since 1938, when we began keeping records, Kubicek stated. It has increased over $100 since 1949 when the average was $282.

Within specific categories of engineering, electrical engineers received the highest salaries, $461 per month as compared with $416 in 1955. Other engineering specialties showing significant salary increases are chemical engineering, which rose from $365 in 1955 to $424, and civil engineering, which jumped from $380 to $434 in 1956.

Kubicek pointed out that the over-all average also included starting salaries for mechanical, fire protection and safety, industrial and metallurgical engineers, as well as beginning architects.

These figures are based on a 40-hour work week and do not include starting salaries of graduates whose work experience prior to graduation exceeds one year. Neither are statistics included for graduates who studied in the IIT evening division while regularly employed.

Members of the class of 1956 participated in a record 2,454 personal interviews with representatives of industry and government. On the average, each June graduate had personal interviews with eight organizations.

"This compares favorably with the average number of personal interviews for graduates during the past five years," Kubicek said. "Since 1951, interviews have run from six to eight per graduate."

Power Conference Slated for March, 1957

The 19th annual American Power Conference, sponsored by Illinois Institute of Technology, in cooperation with 14 universities and nine technical societies, will be held at the Hotel Sherman, Chicago, on March 27-29, 1957.

The conference, which yearly attracts some 3,000 business and industrial executives, engineers, educators, and government officials, provides a forum for the discussion of problems and exchange of information concerning the electric power industry and associated activities.

The universities cooperating with Illinois Tech in sponsoring the 1957 conference are Iowa, Iowa State, Michigan State, Northwestern, Purdue, Illinois, Michigan, Minnesota, Wisconsin, Texas A. & M., New York, California Institute of Technology, Georgia Institute of Technology, and Massachusetts Institute of Technology.

The cooperating national and regional technical societies are: American Institute of Chemical Engineers, American Institute of Electrical Engineers, American Institute of Mining and Metallurgical Engineers, American Society of Civil Engineers, American Society of Heating and Air Conditioning Engineers, American Society of Mechanical Engineers, National Association of Power Engineers, Western Society of Engineers, and Engineers' Society of Milwaukee.

Conference director is Dr. R. A. Budenholzer, professor of mechanical engineering at Illinois Tech.

ASTM Proceedings Has Been Published

The 1955 edition of the ASTM *Proceedings* has recently been published. The 1264-page volume records the technical accomplishments of the American Society for Testing Materials for the year 1955. It includes many technical reports and papers together with discussion which has been offered to the Society during the year and accepted for publication in the *Proceedings*.

Leading the volume is the Summary of the Proceedings of the 58th Annual Meeting, held in June 1955, listing by title and author the program for each of 32 sessions. The annual address by President Norman L. Mochel, entitled "What Is It?" speaks of the pressing need for individual identification of materials and products, especially those which look alike but differ widely in strength and other important properties.

Reports of the technical committees, of which there are 70, and their appendices provide a wealth of useful technical information as do the 34 technical papers and discussions on a wide variety of subjects pertaining to research and testing of materials.

In addition to the papers and reports embodied in the *Proceedings*, there are listed in the table of contents all symposiums published separately as Special Technical Publications (STP's) and all papers published in the ASTM *Bulletin*.

It should be emphasized that in addition to reports and technical papers, many of which have been given at the Society's Annual Meeting and some of which have been preprinted, the *Proceedings* contain much discussion that has been submitted and not previously published.

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Power Development

(Continued from Page 4)

already mentioned one — the fact that nuclear power is important because all *energy* is important.

Much more important however, is the concentration of nuclear power. Remember, *one quarter of a cubic inch* of uranium can produce as much energy as six million cubic feet of gas, as seven thousand cubic of oil, and five thousand cubic feet of coal.

It stands to reason that no source of energy so extremely concentrated is going to be ignored no matter what difficulties may stand in the way of its adoption just now. There is little or no question that at the present time the cost of nuclear power is considerably higher than the cost of power from conventional fuels. But there is no valid reason for believing that these costs will continue to be higher in the future. Even now, some of the plants being built are obsolete from an economic standpoint. But costs will come down as we gain experience with nuclear power plants.

So far, no nuclear power plants are in operation in this country. Indeed, the only nuclear power plant that is in operation and which has been in operation for the past two years is the one in Russia. True, this is a small plant — only 5000 kilowatts of electrical power — but the fact remains that this is the only nuclear power plant in the world that was actually built for the purpose.

Some time this year, probably in the fall, the Calder Hall Station in England will go into operation and this will be the first really large station to go into service. This will be at least 60,000 kw. Then, next year — towards the end of 1957 — our own Shippingport station is scheduled to go on the line near Pittsburgh.

Some people seem surprised to learn that the first large nuclear power station to be completed is in England. The reason for this is not so much that the United States is behind Great Britain in the development of nuclear power stations but is due to the fact that Great Britain is experiencing a fuel crisis right now. Nuclear power comes to England just in the nick of time because of the urgency of the fuel situation. Her coal is becoming increasingly difficult and more costly to mine, and with an expanding electrical load has to act fast. So the English are determined to develop nuclear power plants as rapidly as possible. The urgency of the situation calls for simple and reliable nuclear power plants using natural uranium. This is the reason for the large gas cooled reactors at Calder Hall Station. These are two 50 to 100 megawatt graphite moderated *plutonium producing* reactors comprising one station. Power will be taken from these units as a by-product.

Six more such reactors in three stations will also be built immediately as *Chinese* copies of Calder Hall.

These English nuclear plants probably will not be as efficient thermally, as some of those planned on this side of the Atlantic, but two factors govern the selection of the English designs. The first of these which I have already mentioned, is the urgency of the fuel situation. The second is the higher cost of producing power in England as compared with the United States. Even with the higher power costs in Britain, the designers of Calder Hall admit the gas-cooled reactors cannot stand on their own since the electricity cost is estimated at 0.7 pence per kwh. They are competitive only when there is a market for plutonium.

On this side of the Atlantic, we have more time in which to develop competitive nuclear power. The successful development of the pressurized water reactor for the submarine *Nautilus* and the relative abundance of enriched uranium over here has had a marked effect on the choice of reactors for the first nuclear power plants in the U. S.

Both the Shippingport and the Consolidated Edison plants as well as the proposed plant for the Yankee Atomic Electric Co. in Massachusetts are all of the pressurized water type, using enriched fissionable material as fuel.

The reason for the choice of this type of reactor for these early plants was the fact that we knew this system would work. The *Nautilus* proved that.

The Shippingport reactor, basically, is similar to the reactor on the *Nautilus* but unlike the *Nautilus* reactor, the Shippingport unit is of the regenerative type.

As you know, a vast number of reactor types are possible but the most important way of classifying them is in the way they use their fuel. And there are three categories.

First is the non-regenerative type or the *burner-upper* which uses up all the fissionable material without creating any new fuel in the process. The reactor on the Nautilus is of this type.

Second, is the regenerative type or the *stretcher-outer* which replaces part of the fuel it consumes by changing fertile material into fissionable fuel.

Finally, there is the *breeder* reactor which creates as much *or more* fuel as it consumes. The breeder reactor is the most glittering dream of all because it promises to make available for fission all of the natural uranium there is in the world.

There are of course many other ways of classifying reactors. Indeed, the number of reactors is almost endless, and we will have to build a number of nuclear power plants before we can answer questions concerning competitive nuclear power. It is expected that we will have some of the answers by around 1960 because by that time we will have data on the costs of construction and operation of all kinds of reactors.

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Of course we will find that there is probably no *best* type of reactor for all purposes, no more than we can say that there is a *best* type of conventional power plant. Those of us in the power industry know that the design of a power station depends upon many different factors, and so it will be with nuclear plants.

It is interesting to consider the almost unending number of possible reactors. Some of you may have seen the table which Dr. Alvin Wienberg, director of Oak Ridge National Laboratory made up to show the different reactor combinations that are possible. He listed the various elements involved in reactor design somewhat in this fashion — listing *fuel, fertile material, moderator, coolant, neutron economy* and *geometry*. Under each heading he listed the different items, four for fuel, two for fertile material, six for moderator, six for coolants — and so on.

Table listing various elements and conditions in the design of nuclear reactors

Fuel	Fertile Material	Moderator	Coolant	Neutron Economy	Geometry
Mat. U	Thorium	H-0	Gas	Fast	Heterogeneous
U-235	Uranium	$D_2$0	$H_2$0	Int.	Homogeneous
U-233		Be	$D_2$0	Thermal	
Pu-239		Be-0	L-M		
		Nothing	Hydro-carbons etc.		
4	2	6	6	3	2

Multiplying these various sums, we get

$$4 \times 2 \times 6 \times 6 \times 3 \times 2 = 1728$$

So we have at least this number of possible types to choose from. It is not surprising, therefore, that the problem of reactor design has been confusing to many who do not understand the basic principles of their operation. Various countries are geared to certain designs because of scarcity of materials or fuels. Thus most European countries base their designs on the use of natural uranium as fuel since they do not have enriched uranium available. Different environmental situations affect reactor design and the use of nuclear energy. I have already mentioned the situation in England.

Here in the U. S. we are engaged in a big reactor demonstration program involving pressurized water reactors, boiling water reactor, breeders, sodium graphite and homogeneous units. All of these are expected to be ready by around 1960. Two of the latest to be announced are the Gas-cycle plant for Holyoke, Mass. and the Homogeneous-reactor plant for the Woolverine REA system near Detroit.

It is too early to speculate on which of all these various plants may be able to produce at costs competitive with local fuel costs. Indeed, far too much effort has been expended in more or less useless calculations concerning the economics of these future plants. It is natural, of course, for engineers to try to determine probable costs but in this field of atomic energy the data of which to base estimates has been so meager as to make such efforts extremely uncertain.

To anybody who knows the history of the electric power development in the United States, it is inevitable that competitive atomic power will be developed during the next decade — possibly much sooner. According to Willis Gale, chairman of the Board of Commonwealth Edison the proposed Dresden Station using the Dual-cycle Boiling water reactor will generate electricity at a cost on a par with that of the company's large fuel-fired plants, provided some 15 million dollars of development expense can be deducted from the 45 million the plant is to cost.

Much still remains to be done before nuclear power becomes widely competitive but we are well on the way and the decisions made on the data that will be available around 1960 could result in economically competitive plants coming into operation 3 to 5 years later, or around 1965. The McKinney Report estimates that the amount of atomic power that may be in existence by 1975 may easily be equal to 40 per cent of the electric generating capacity of the United States today.

Despite the millions of dollars that have already been spent in bringing atomic power to its present state of development, it should be clear that we are still at the beginning of a new art. In this talk I have not even mentioned thermonuclear power. We may never realize a controlled thermonuclear reaction but we are busy trying to find out. While practically nothing official has been said on the subject, what the McKinney Report has to say about it is quite optimistic, and some of us may yet live to see the day when we can burn sea water.

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Yours is Best Retirement Plan

The best kind of retirement plan is the one you make yourself, according to the Chamber of Commerce of the United States.

If you are in your 40's or 50's, or even younger, it is not too soon to start thinking about what you want to do with the years that remain after your regular job ends.

A good many factors enter into a sound retirement plan—health, hobbies, companionship. But, says the Chamber, the keystone to a happy retirement is financial planning. Several steps toward the right kind of financial planning are suggested in a new Chamber publication "Look Forward to Your Retirement." Here are a few:

1. Maintain a savings account. At least a few hundred dollars in the savings bank is one of the best investments you can make. As the account grows, you may want to invest in common stocks or corporation bonds and so increase your returns.

2. Buy your own home. Monthly payments often are no greater than rent. Frequently, there are income tax advantages to home ownership. By the time you retire, you probably will own your home free of mortgage. If you sell it then, the money can go far toward providing the retirement you have planned. If you continue to live in your home, the cost will be far less than rent.

3. Have a life insurance program—Investment in life insurance can provide a lifetime monthly income after you retire as well as protecting your dependents before your retirement. Your life insurance program should be worked out with the help of a qualified life underwriter.

4. Understand Social Security — few persons do, although the program is 20 years old. You should be aware of the so-called "work clause" that may cause your benefits to be withheld in case you continue to work after age 65. Social security is intended to provide only a minimum protection against the needs of old age. It should be supplemented by other financial provisions.

5. Know your company pension plan —company pension plans differ. You should know how your company plan affects you so you can take account of pension rights in working out a total plan for income during retirement.

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Chemical Advisory Committee Appointed

Appointment of a 12-man Advisory Committee for the 9th National Chemical Exposition which will be held in the Cleveland Public Auditorium Nov. 27-30, 1956, has been announced by R. L. Savage and A. E. Schneider, joint chairmen of the Exposition committee. Members of the advisory panel include: Allen Abrams, vice-president, The Marathon Corporation; Lawrence Flett, consultant, National Aniline Division, Allied Chemical and Dye Corporation; Robert C. Hienton, vice-president, Cleveland Electric Illuminating Co.; Sidney D. Kirkpatrick, editorial director, McGraw-Hill Publishing Co.; Carl S. Miner, director, The Miner Laboratories; Walter J. Murphy, editorial director, American Chemical Society Journals of Applied Chemistry; George L. Parkhurst, vice-president, Standard Oil Company of California; Thomas F. Patton, chairman of the Board, Cleveland Chamber of Commerce; Raymond Stevens, vice-president, Arthur D. Little, Inc.; Ernest H. Volwiler, president and general manager, Abbott Laboratories; J. C. Warner, president, Carnegie Institute of Technology, and president of the American Chemical Society; and Clyde E. Williams, president, Battelle Memorial Institute.

The National Chemical Exposition is moving to Cleveland for the first time since its founding in Chicago in 1940. The 1956 show will be sponsored jointly by the Cleveland and Chicago Sections of the American Chemical Society.

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It's Non-Defense Q. T. Research

Not all of the hush-hush research, experimentation and engineering development going on in the country is connected with defense or other top-secret government projects. In Grand Rapids, Mich., there is a busy but "highly confidential" research and development laboratory. It is at the Jarecki Corporation, one of the nation's largest die and stamping concerns, serving chiefly the automotive and appliance industries. Staffed by experts in the field, this division of Jarecki has as its prime objective the working out of new devices for making the every-day lives of ordinary citizens safer, easier and more comfortable. And it is unique in the country. for at no time does it, or can it, get credit for its developments.

What goes on in this department has to be kept under wraps not only while it is going on, but even after a particular development is ready to be put into general public use—no matter how unusual or trend-making it may be. This is because the practical and sometimes revolutionary devices that come out of this engineering laboratory are not made by the Jarecki Corporation for its own use or its own marketing; but are made for many different "customers" in the automotive and appliance fields for which this corporation produces dies and stampings. And since each development belongs to the customer who has requested the work done on it—be it a new convenience or safety feature for a home appliance, or a vital part for a new automobile engine design —the marketed product also belongs to the customer; and along with it, the secret of for whom and by whom it was developed.

For example, right now in the testing state is an auto device which not many months from now is going to have millions of motorists—particularly women motorists—blessing its inventor. And you will have to take the Jarecki Corporation's word for this, for the source and the product will never be tied together in the annals of public information. Several other developments in passenger cars that have made front page engineering design news in the last few seasons were also born in this laboratory. Also, thousands of homemakers are enjoying extra conveniences or work saving features in kitchen appliances for which they can thank the engineers that staff this Research and Development Division at Jarecki's.

Head of this division, D. H. Bracken, is a research engineer of some 20 years experience, all in the automotive and appliance fields. He says that "although we, in this division, do not receive public recognition, we take a great deal of personal pride in our accomplishments. The work is highly absorbing and challenging and I wouldn't want to be in any other field."

These are Potent Products

Fission products of a reactor, if inhaled or ingested, are from three million to two billion times more toxic than chlorine, the most potent industrial poison, says *Electrical World*.

Human Engineering Conference Scheduled

A Human Engineering Conference, co-sponsored by Manhattan College, will be held in conjunction with the Third International Automation Exposition in New York, Nov. 26-30, 1956. It will be directed by Dr. Douglas Courtney, industrial consultant, and will be held at the new Trade Show Building, 500 Eighth Avenue, New York City.

Objective of the Human Engineering Conference is to provide top management with essential knowledge of the design of systems for human use and, especially, of the relationship between Automation and the Individual. Topics to be covered include: Machine Design for Human Use; Man-Machine Placement; Research Requirements for Complex Industrial Operations; and Economic, Social, and Cultural Implications of Automation.

Administrative, engineering and research executives, and their representatives, taking part in the Human Engineering Conference, will have nearly 200 exhibits at the Third International Automation Exposition as on the spot illustrative material. Complete details concerning registration and the schedules of the eight sessions will be mailed to interested persons upon request to Richard Rimbach Associates, Inc., Room 359, 525 Lexington Avenue, New York 17, N. Y.

This Human Engineering Conference will be taking place subsequent to the Office Automation Conference announced a month ago, co-sponsored by Fordham University and the Third International Automation Exposition.

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Reviews of Technical Books

Electronics in Industry

Electronics in Industry, by George M. Chute, McGraw-Hill Book Company Inc., New York 36, N. Y. Second edition. 1956. 431 pages. Price $7.00.

This second edition has been revised with the idea of giving a general introduction and the basic principles utilized in industrial electronic circuits to the men in industry who use and service such equipment.

Chute explains the function of electronic devices in practical circuits. He has arranged and supplemented the material so that it may be of value in three instances. It may be used by technical institutes for a general or survey course; or by university students of mechanical, chemical, civil, industrial, or aeronautical engineering; and it may serve as a supplementary text in electrical engineering.

He points out that his prime concern is to arouse sufficient interest in industrial electronics, not in the designer or builder of electronic equipment, but in the student who will use his text as a supplementary volume and will advance to more complete coverage of special subjects.

Consequently, he aims for simplicity by offering example problems in simple arithmetic; most of these were used in class instruction. He explains already-designed equipment built by well-known manufacturers. He introduces the subject of tubes gradually and briefly discusses their nature, so that no previous knowledge of tubes is necessary. In fact, there are a few instances where statements are not technically precise; this is to avoid causing confusion to the student.

In order to up-date this revision, recent designs of industrial controls are substituted; designs for resistance welding are described in greater detail; material from an earlier text *Electronic Control of Resistance Welding* is also included; and there is an added chapter on simple closed-loop systems, which gives a background for feedback controls.

George M. Chute is professor of electrical enginering at the University of Detroit. While serving as an Application Engineer with the General Electric Company in Detroit, he taught an evening study course in industrial electronics. In this class the nucleus of this volume took form.

R.G.G.

Mechanical Engineering

Mechanical Engineering Practice, by Charles F. Shoop and George L. Tuve, McGraw-Hill Book Company Inc., New York 36, N. Y. Fifth edition. 1956. 471 pages. Price $7.00.

This new edition of a comprehensive, self-contained text and reference book is the result of revision by the authors in order to meet the demands of recent trends in mechanical engineering instruction.

Shoop and Tuve recognize that the tendency is to place emphasis on scientific fundamentals in engineering curricula, and that instruction in the laboratory should be changed because of the rapid evolution of measuring techniques.

The greater use of electrical instruments and transducers, and the study of the dynamics of the processes of flow and heat transfer are stressed. Each chapter contains new material; new techniques for mechanical measurements, dynamic characteristics of processes, and automatic control are given special prominence.

An important addition is the chapter "Characteristics of Automatic Controls," co-authored by Professor Lawrence G. Seigel. This field has become a required part of the education of mechanical engineers, and it has been given comprehensive coverage.

The precise requirements of the codes and standards sponsored by various professional groups is also pointed out.

Charles F. Shoop is Emeritus Professor of Mechanical Engineering at the University of Minnesota, and George L. Tuve is Professor of Mechanical Engineering at the Case Institute of Technology.

R.G.G.

Route Surveys and Construction

Route Surveys and Construction, by Harry Rubey, The Macmillan Company, New York 11, N. Y. Third edition. 1956. 282 pages. Price $6.25.

This third edition of a pocket and reference book, which contains tables for the survey, design and construction of practically all types of route constructions, has been revised to serve as a text and permanent reference book for students, professional engineers, construction engineers and contractors.

Rubey has kept in mind that the course in route surveys must provide the engineering approach as well as the broad basic treatment underlying all the various means of transportation and communication constructions.

Highway, railway, and hydraulic constructions are stressed in this text. Other applications are suggested, for the author believes that the engineer should be educated broadly and professionally and not merely trained narrowly in the techniques of a special field.

In his preface Rubey says that few engineering curricula allow adequate courses and time for engineering construction with its relation to professional management and for modern photogrammetric applications; hence their inclusion in this edition. All civil engneers need complete reference material and tables for routes close at hand throughout their careers.

The treatment in this edition is comprehensive and has been up-dated to accent professional engineering, engineered-construction, professional management, contracting, and practical photogrammetry, for these are the most promising and profitable outlets for the majority of civil engineers.

R.G.G.

Conference to Feature Papers

More than 100 technical papers and 235 commercial exhibits will be featured at the 12th annual National Electronics Conference this year.

A record attendance of 10,000 is expected at the three-day meeting—the nation's leading forum on electronic research, development, and application —scheduled for the Hotel Sherman in Chicago on Oct. 1-3.

Some 7,500 attended the technical sessions and viewed 186 exhibits at last year's conference.

Robert R. Jenness of Northwestern University has been elected president of the 1956 National Electronics Conference.

Other officers are: Karl E. Rollefson, Muter Co., executive vice president; John M. Gage, Purdue University, chairman of the board of directors; John S. Powers, Bell and Howell Co., executive secretary; Elmer H. Scheibe, University of Wisconsin, secretary; Howard H. Brauer, Bell and Howell Co., treasurer; and Charles W. McMullen, Northwestern University, assistant treasurer.

Arrangements committee chairman this year is Eric C. Book of Andrew Corp., with H. L. Messerschmidt of Western Electric Co., Edmund P. Kelly, Chicago Standard Transformer Co., and R. B. Schulz, Armour Research Foundation of Illinois Institute of Technology, heading sub-committees on information, luncheons, and technical sessions, respectively.

Other committees and their chairmen are: awards, W. O. Swinyard, Hazeltine Research, Inc.; exhibits, G. J. Argall, De Vry Technical Institute; finance policy, J. D. Ryder, Michigan State University; procedures, G. T. Flesher, Illinois Tech; proceedings, G. W. Swenson, Jr., Michigan State University; program, L. T. De Vore, Stewart Warner Electronics; publicity, Victor J. Danilov, Illinois Tech and Armour Research Foundation, and registration, J. W. Powers, Bell and Howell Co.

The conference is sponsored each year by American Institute of Electrical Engineers, Institute of Radio Engineers, Illinois Institute of Technology, University of Illinois, and Northwestern University.

Participating also in the conference are Michigan State, Purdue, Michigan and Wisconsin universities, and Radio-Electronics-Television Manufacturers Association, and Society of Motion Picture and Television Engineers.

Wood Expands in Engineering Value

Wood's expanding uses as an engineering material, in light and heavy construction, were described for the Missouri Association of Building Officials and Inspectors, at their spring meeting in St. Louis, by D. R. Norcross, assistant sales manager of Timber Engineering Company, research affiliate of the National Lumber Manufacturers Association.

Discussing new processes and methods that make wood more durable, versatile, and adaptable to contemporary design and construction, Norcross cited the impetus given to engineered timber construction by the introduction, 23 years ago, of Teco connectors, and his organization's development and free distribution of technical data to designers.

He described the three principal timber construction systems—Teco connector, Lamella, and glued laminated—and pointed out the advantages of clear-span roof construction attained with the system.

The building officials then were given an account of how engineering had been brought to the residential and small commercial building fields, ten years ago, by the Teco split-ring connector in clear-span trussed rafters. Norcross pointed out that, compared to conventional roof framing methods, Teco trussed rafters provide greater flexibility of interior design, as well as substantial savings in time, material, and labor.

The new Teco film, "Engineered Timber Construction," was shown to illustrate the functions, uses, and advantages of the various timber connectors.

ASCE Announces New Pipeline Division

The American Society of Civil Engineers has announced that its Board of Direction has authorized the establishment of a Pipeline division. Organization of the new unit is in process. Heretofore its interests and activities have been conducted by the Committee on Pipelines of the Construction Division. With the new status of this group the Society will have a total of 14 technical divisions.

Creation of the Pipeline Division reflects the relationship of civil engineers with the pipeline industry. It has been authorized to satisfy an increasing need for specialized technical and professional study, development and practice.

The purpose of the Committee on Pipelines, taken over by the new division, was "to advance and correlate scientific knowledge and promote and coordinate economic development and construction of engineering projects in connection with the transmission of fluids, gases or solids by means of pipelines, and as it pertains, in particular, to the science of civil engineering in the fields of surveying and line location, design, construction and operations, and to develop, promote and further the mutual utilization of the codes for pressure piping as between pipeline, highway and railroad groups and public authorities."

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WSE Personals

Dr. Ronald C. Vickery, London-born scientist, and one of few world experts in the field of the "rare earths," has been appointed head of the Chemistry Department of Horizons Incorporated, Cleveland industrial and governmental research organization.

The announcement was made by Dr. Eugene Wainer, vice president and director of research, who engaged the services of Dr. Vickery last August while the Englishman was working in Australia.

A graduate of the University of London and of Oxford, Dr. Vickery was a consulting chemist until the Nazi bombs destroyed his laboratories during World War II. At the invitation of the Australian government, he went "down under" where he worked on chemical development for five and one-half years with the Commonwealth Scientific Industrial Research Department.

Dr. Vickery has written extensively on the rare earths, which, in addition to forming part of the ashes in nuclear reactions, are used in metallurgy, ceramics, metal and non-metal combinations and in the optical field.

* * *

John K. Diederichs has been named manager of the engineering economics research department at Armour Research Foundation of Illinois Institute of Technology, Chicago.

Diederichs' appointment became effective July 1, according to Dr. E. H. Schulz, ARF assistant director.

A former management consultant, Diederichs joined the Foundation Jan. 1 as assistant manager of the engineering economics research department.

The department was established by ARF in 1955 to meet the increased need for combined scientific, engineering, and economic background in solving many industrial problems, Schulz explained.

Diederichs will direct research in such areas as subscribers services, area development, forcasting, engineering economics, human engineering, and nuclear economics.

Prior to joining the Foundation, Diederichs was associated with Booz, Allen and Hamilton, management consultants, and in sales promotion for Pan American Airways.

He served as a navy lieutenant in the Pacific during World War II after graduating with an A.B. degree from the University of Chicago in 1943.

Diederichs is a member of the Institute of Management Sciences, Society of Industrial and Applied Mathematics, Operations Research Society of America, Institute of Radio Engineers, and the Econometric Society.

* * *

Frank O. Phillips has been appointed assistant to vice president-steel of United States Steel Corporation with responsibility for maintenance planning, it has been announced.

Phillips was born in Valparaiso, Ind., and attended Iowa State college where he was graduated with a degree in electrical engineering in 1933. He was first employed by United States Steel as an electrician at the Gary Sheet and Tin Mill in 1935. In 1937 he was transferred to Irvin Works as power foreman. He went to Vandergrift Works in 1940 as assistant chief electrician.

Transferred to Homestead in 1941, Phillips advanced through various positions to assistant superintendent of the 100-inch semi-continuous mill in 1949. In 1950 he became superintendent of Homestead's 45-inch mill and in June 1951 he was made division superintendent of maintenance of Duquesne Works, the position he held at the time of his present appointment.

* * *

Dr. Leonid V. Azaroff has been named senior scientist at Armour Research Foundation of Illinois Institute of Technology, Chicago.

Nationally recognized for his work in X-ray diffraction and crystallography, Azaroff currently is completing a book, co-authored by M. J. Buerger, on *The Powder Method in X-Ray Crystallography*.

Azaroff joined the Foundation in 1953 as an associate physicist and was promoted to research physicist in 1955.

Azaroff was engaged in infra-red research while serving in the U.S. Army from 1944 to 1946. He also has worked as an assistant engineer at Raytheon Manufacturing Co. and as research assistant at MIT.

* * *

James D. McGee, general personnel director of the L.O.F. Glass Fibers Co., has been presented an award for merit, his second in two consecutive years, by the Research Institute of America.

A citation and bronze medallion were presented to McGee "for effective contribution to the development of executive skills in human relations and manpower utilization."

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Tunnel Location Is Conditioned

To air-condition a hole in the ground can be quite a problem.

A New York structural display company, called upon to create a cool, pleasant enclosure in a tunnel where the temperature is consistently over 90 degrees, used equipment built by the Typhoon Air Conditioning Company to do the job.

The tunnel, part of the complex maze of underground passages that make up Grand Central Terminal, is being used to display *Pioneer III*, a new ultra-lightweight railway passenger coach of the Budd Company of Philadelphia.

The Budd planners, seeking a central location for the convenience of railroad officials and the press, found the Grand Central tunnel, under the Waldorf-Astoria hotel, ideally situated but unsatisfactory in two major respects: it was dirty and the already hot enclosure would be made even hotter by the lights necessary to illuminate the area.

The problem was passed to the Structural Display Corp., engaged to build the enclosure, and Structural Display promptly passed it on to the Billen Engineering Company, one of Typhoon's New York distributors.

After studying the difficulties involved in the task, the Billen engineers worked out an arrangement of Typhoon waterless air conditioning equipment that guaranteed a comfortable 70 to 75 degree level. This fifteen degree drop was accomplished despite the fact that the partitions of the enclosure left a four foot opening around the top. (From ceiling to floor in the tunnel is sixteen feet. The partition is twelve feet high.)

To make this subterranean showplace comfortable, fifteen tons of Typhoon waterless air conditioning equipment—three five-ton air cooled condensing units and three five-ton low side air handling units—were used with the confidence that 100 persons could be accommodated comfortably in the 140 ft. by 30 ft. enclosure when the "passenger coach of the year" went on display July 16. The installation is the first of its kind ever used in the Grand Central tunnel.

Founded in 1909 as the Typhoon Fan Co.—now known as Typhoon Air Conditioning Company, a Div. of the Hupp Corporation—it originated the idea of using 12-foot exhaust fans to cool the popular nickelodeons of the day. In the more than two generations since, cooling systems of various designs have been installed by Typhoon in more than 8,000 theaters, hotels, stores and restaurants—and one railroad tunnel.

Fire Hazard Survey To be Made for A.F.

The first detailed and comprehensive survey and analysis of the fire hazards and problems resulting from United States Air Force world-wide operations is being undertaken by Midwest Research Institute, under contract with Wright Air Development Center, Air Research and Development Command.

Dr. Charles N. Kimball, president of Midwest Research Institute, announced in Kansas City, Mo., the inauguration of the survey. Cooperating with the Institute is U. S. Fire Protection Engineering Service, a specialized consulting firm, of Kansas City.

The U. S. Air Force employs much equipment and many materials that are inherently flammable or explosive in character, J. Glenn Seay, of the Chemical Engineering Division of Midwest Research, explained. At the same time, research efforts are constantly developing or improving measures to prevent the outbreak and serious spread of fire and to detect promptly all types of fires.

Consequently, the Air Force requested the institute to conduct a comprehensive study of existing and forseeable fire hazards and problems, with particular emphasis on the following factors:

1. Those existing fire problems presenting potentially the most critical deterrent to the accomplishment of the USAF mission.

2. Those fire problems resulting from the development and operational integration of new weapons, planes, fuels, ammunition, etc.

3. Those fire problems jeopardizing the safety of USAF personnel and civilian population.

Titanium Facilities To be Expanded

Another expansion of its Niagara Falls facilities for the manufacture of titanium tetrachloride has been announced by Stauffer Chemical Company. The addition, say company executives, will again double the plant's capacity for the titanium chemical.

At the present time Stauffer is just completing an expansion which about doubles the facilities the company had in Niagara Falls in late 1955. The new program, which is scheduled for completion in early 1957, quadruples Stauffer's capacity of a year ago.

Although titanium tetrachloride is a chemical which has attracted widespread attention only in recent years, Stauffer has been making this and other metal chlorides, such as aluminum and silicon chlorides, for nearly 40 years. Originally titanium tetrachloride found its major application as the basic material for the production of military "smokescreens" and commercial skywriting "smokes." Now, however, it is the key raw material for the manufacture of the tough, light metal titanium.

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Automation Know-How Conference Date Set

Details of the top-management know-how conference on data processing automation for the office to be presented Nov. 26-27, 1956, are announced by the Fordham University School of Business and the Third International Automation Exposition, co-sponsors. The International Automation Exposition will be held at the new Trade Show Building, 500 Eighth Avenue, the week of Nov. 26-30, 1956.

According to Gordon L. Mattson, management consultant and director of the conference, the program is "designed and staffed to serve the needs of senior officers who are contemplating office automation projects or who already have these projects under way."

Mattson added:

"The Office Automation Conference will stress the importance of senior officers taking an active leadership role in such projects. It will flag the dangers of fully delegating these responsibilities to staff and line personnel.

"Proper preliminary planning, selection of equipment to serve the end results, and careful timing can have some far reaching effects on the senior officer's functions. This is true not only in all large organizations but also in many of medium size and some quite small.

"Such projects involve months of preparation and frequently a very heavy investment. They must be planned from the start by senior administrators to serve economically the objectives of senior administrators.

"Maximum benefit from the conference will be obtained when an organization sends its key senior officers together with members of the technical staff. It is vital that the technical staff have an opportunity to share the views of senior officers of other companies that have already been 'through the mill.' These insights will instruct them in how to apply their technical know-how in preparing suggestions and plans which will be of maximum value to their own senior administrators.

Complete details concerning registration and times of the two days' sessions will be mailed to interested persons upon request to the Third International Automation Exposition, Room 359, 525 Lexington Avenue, New York 17, N. Y.

WSE Applications

In accordance with the By-Laws of the Western Society of Engineers, the following names of applicants are being submitted to the Admissions committee for examination as to their qualifications for admission to membership into the Society in the various grades, i.e., Student, Associate, Member, Affiliate, etc. All applicants must meet the highest standards of character and professionalism in order to qualify for admissions, and each member of the Society should be alert to his responsibility to assist the Admissions committee in establishing that these standards are met. Any member of the Society, therefore, who has information relative to the qualifications or fitness of any of the applicants listed below, should inform the Secretary's office. The Secretary's office is located at 84 East Randolph Street. The telephone number is RAndolph 6-1736.

74-55 Frederick C. Brightly, Jr., President, Brightly Galvanized Products, Inc., 3330 S. Cicero Ave., Cicero, Ill.

75-55 Theodore J. Ferring, Jr., 1306 Elm St., Dubuque, Ia., attending Loras College.

76-55 James J. Pisco, Chief Engineer, Chicago Regional Port District, 360 N. Michigan Ave.

1-56 Robert L. Allen, 3224 S. Michigan Ave., attending Illinois Institute of Technology.

2-56 Emanuel Siegel, Structural Designer, Burnham and Hammond, 53 W. Jackson Blvd.

3-56 Donald V. Oetjen, Sales Engineer, Ingersoll-Rand Co., 400 W. Madison St.

Heat Transfer Firms Hold Summer Meet

The summer meeting of the Fuel Oil and Water Heater Manufacturers' Association was held at Pocono Manor, Pa., on June 21st and 22nd.

The Association membership consists of ten of the leading manufacturers of shell and tube heat transfer equipment. They are Adsco Industries; Bell & Gossett Company; Davis Engineering Company; General Fittings Company; Manning & Lewis Engineering Company; Patterson-Kelly, Inc.; Richmond Engineering Company; Sims Company; Water Tube Boiler & Tank Company and Yula Water Heaters, Inc.

The Fuel Oil and Water Heater Manufacturers' Association is devoted to the improvement, increased performance and the standardization of shell and tube heat transfer equipment. At the summer meeting recommended performance standards for high temperature and high pressure heat exchangers were heard and are presently being considered and evaluated by the association's Technical Committee.

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Electronic Brain Has "Artery" System

The electronic brain system now has "arteries" in many parts of the country, it was reported in San Francisco on June 26.

One such system, installed for Sylvania Electric Company, feeds information to a Univac computer at Camillus, N. Y., over Western Union Telegraph Company wires, Philip R. Easterlin, Western Union, told a telegraph session at the Summer and Pacific General Meeting of the American Institute of Electrical Engineers at the Fairmont Hotel.

"This development opens the automation field to many new applications by providing the vital input and output communications needs for economical use of expensive computing equipment at one centralized point in the patron's scope of operations," Easterlin said.

The information transmitted to Sylvania's Univac includes hourly, daily or monthly payroll, invoices, production forecasts, etc., as well as administrative messages, he pointed out.

Easterlin described the development as "an extremely versatile data control system for use with high speed electronic computers at centralized integrated data processing centers. This system serves as the main artery for data information which can be transmitted simultaneously from cities throughout the country over a Western Union telegraph network. As each unit of classified information is received, it is automatically processed into the proper data category for efficient and high speed programming by modern computers."

In the Sylvania system, Univac is located at Camillus, and connected by telegraph to the company's principal offices and plants throughout the country.

Coal Output Rises

Average output for the coal mining industry could be pushed upward as early as 1960 to 16 tons per man day, according to *Coal Age*. Today's mines average about 11 tons per man day, though many individual mines have already achieved or bettered the 16-ton rate.

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Diamond Lab School Established

The nation's first laboratory for instruction in shaped diamond tool technology has been established at Illinois Institute of Technology, Chicago.

The laboratory has been assembled by the IIT mechanical engineering department under a $30,000 grant from Industrial Distributors, Ltd., Johannesburg, South Africa, according to Dr. Frank D. Carvin, department director.

A course designed to instruct industry in the construction and use of shaped diamond tools will be offered at Illinois Tech for the first time this fall, Carvin said.

The course will cover selection of diamonds for various uses, sawing and shaping diamonds for tools, and turning, boring, and wheel dressing.

"Diamonds have been used for industrial purposes for many years," Carvin explained, "but their importance in modern mass production manufacturing methods was not fully appreciated until the advent of World War II.

"During that period, the extreme hardness and abrasion resistant properties of the diamond, and the relation of these properties to modern industrial requirements were fully exploited," he said.

The new laboratory is equipped with a diamond saw, two diamond scaifing machines, a conditioning machine (scaife resurfacing), two Hardinge precision lathes, an optical comparator, miscellaneous hand tools and instruments, and a supply of industrial diamonds for instruction and practice in shaping diamond tools.

The shaped diamond tool technology course will be offered evenings, beginning with the fall semester. Registration will be held Sept. 10 and classes will begin Sept. 17. The course will be offered again during the spring semester and as a special summer course.

Classes will meet twice a week from 6:20 to 9 p.m., with the time divided equally between lectures and laboratory work.

A non-college credit course, the only prerequisites are tool room or machine shop experience and a high school diploma, Carvin explained.

Classes will be taught by Samuel E. Rusinoff, IIT associate professor of mechanical engineering, and Harold C. Miller, diamond technology expert at Armour Research Foundation, an affiliate of Illinois Tech.

For further information on the course, write to: Dr. Frank D. Carvin, Illinois Institute of Technology, Technology Center, Chicago 16, Ill.

Electronic Systems Plant Is Going Up

Ground has been broken in Denver for a new production facility of The Ramo-Wooldridge Corporation, Los Angeles. The plant, which will be located on a 640-acre site near Englewood, south of Denver, will cover 140,000 square feet and will be used to produce electronic systems. It will also house development and liaison facilities.

Present at the ceremonies were Governor Edward C. Johnson of Colorado, Mayor W. F. Nicholson of Denver, Mayor Richard Purcell of Englewood, Mayor Frank Randall of Littleton, William Giggal, chairman, Board of Commissioners, Arapahoe County, Gen. H. L. George, senior vice-president of The Ramo-Wooldridge Corporation, George Fenimore, acting manager of the new production facility, and many civic and industrial leaders.

Gen. John F. Curry, USAF retired, a prominent Denver resident, served as master of ceremonies.

The firm of Pereira and Luckman were the architects. The building contractor is Columbine Commercial Contractors, Inc., of Denver. The facility will be completed in mid-1957.

Current Ramo-Wooldridge contracts support a broad range of advanced work in the fields of fire control systems, modern communications, digital computing and data processing, instrumentation and test equipment. In the guided missile field, Ramo-Wooldridge has technical direction and systems engineering responsibility for Air Force ballistic missiles, including the Intercontinental Ballistic Missile (ICBM) and Intermediate Range Ballistic Missile (IRBM). However, a spokesman for the firm stressed that production at the Denver plant will not be related to the ballistic missile program.

Location of the production facility in the Denver area is in keeping with federal plans for industrial decentralization. The plant is expected to employ approximately 1300 people on a single shift basis.

The Ramo-Wooldridge Corporation was founded in September, 1953, to conduct research, development and manufacture in the broad technical field of systems engineering. The firm has since grown to over 2000 personnel, of whom 600 are scientists and engineers. R-W, which now occupies eight buildings in the vicinity of the Los Angeles International Airport, is engaged in a building program which includes the Denver facility and a complex of nine research and development buildings totaling 900,000 square feet near their present Los Angeles headquarters.

When completed this program will bring the total space occupied by the firm to a million and a half square feet.

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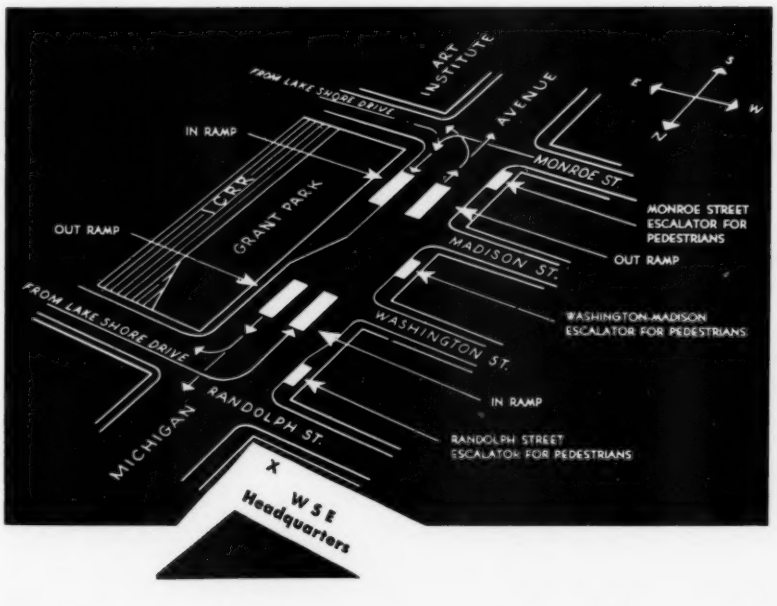

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